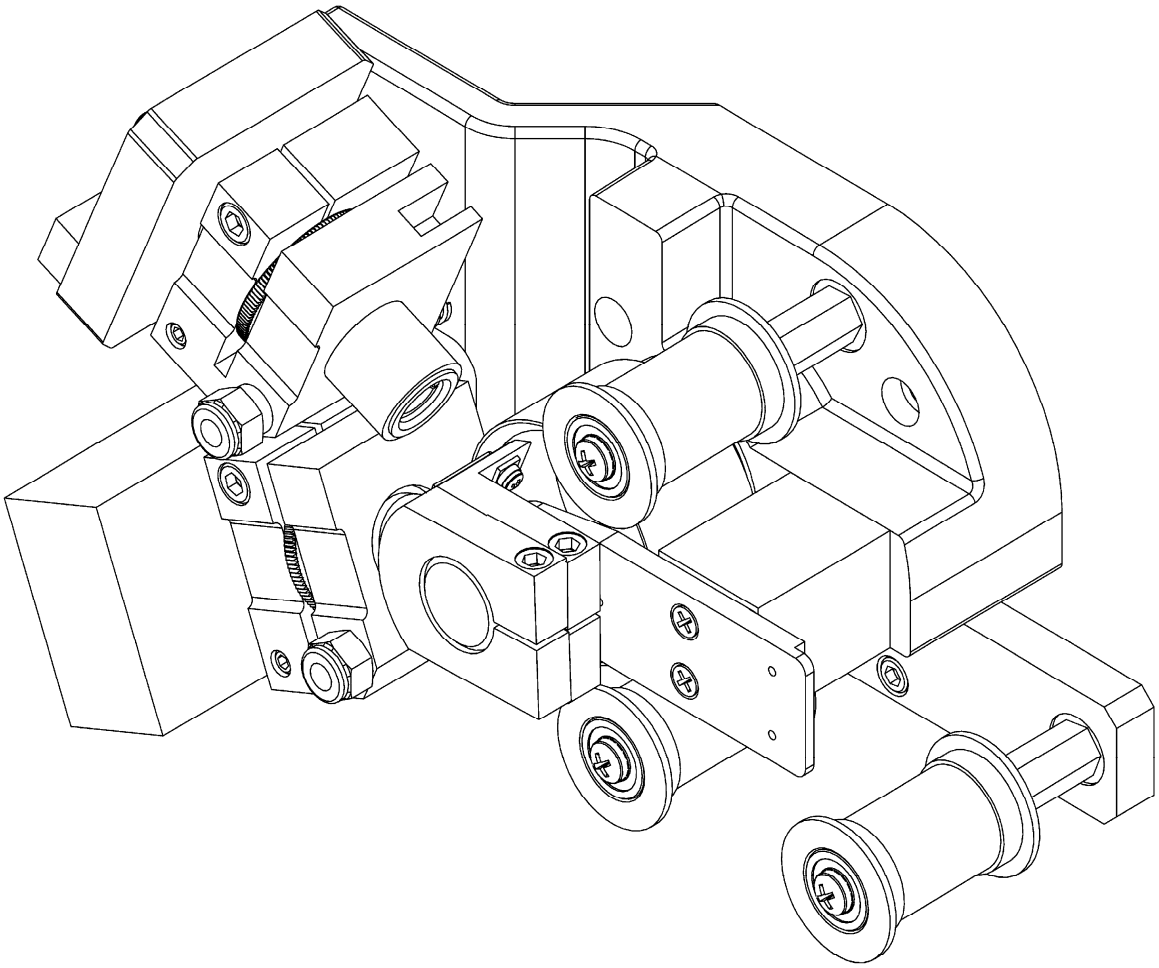
Component
Engineering

14739 Aurora Ave N, #110 Shoreline, WA 98133-6547 • 206-284-9171 • www.componentengineering.com

# STRD-50

## Digital /Analog Sound Reader for Simplex Apogee Installation and Alignment



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# Table of Contents


Chapter 1: Reader Kit Installation ..... 2

Wiring the Readers and Power Supplies 4

Chapter 2: Reader Kit Alignment: Analog ..... 5

Analog Focus 5

Analog Azimuth 6

Analog Lateral 7

Analog Illumination 8

Analog Complete 9

Chapter 3: Reader Kit Alignment: Digital ..... 10

Digital Illumination 11

Digital Lateral 12

Digital Azimuth 13

Digital Focus 14

Digital Complete 15

Chapter 4: Trouble in Paradise? Analog ..... 16

Common Analog Problems, Symptoms, Errors and Bad Fortune 16

Chapter 5: Trouble in Paradise? Digital ..... 17

Common Digital Problems, Symptoms, Errors and Bad Fortune 17

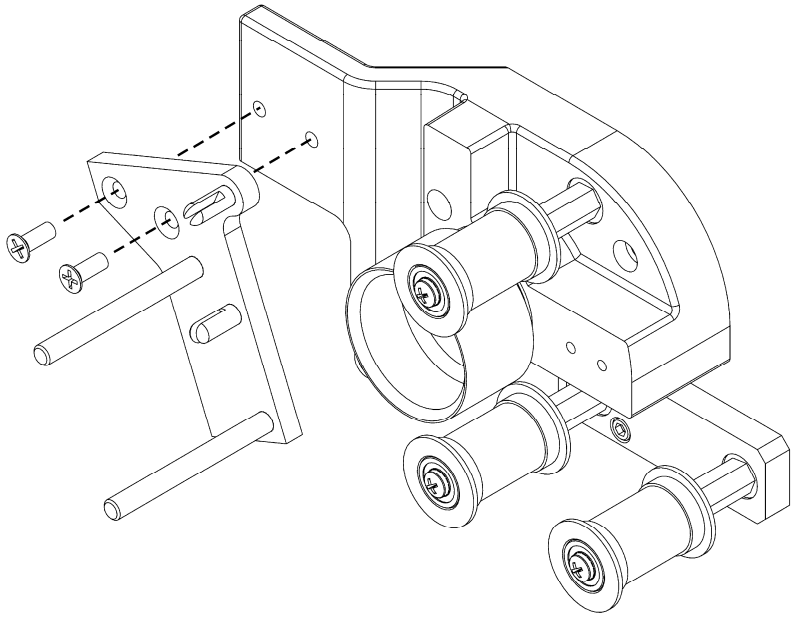
Chapter 6: Kick-Starting Digital Alignment ..... 18

Basic Help on Getting There from Here 18

Chapter 7: Removing a Reader ..... 19

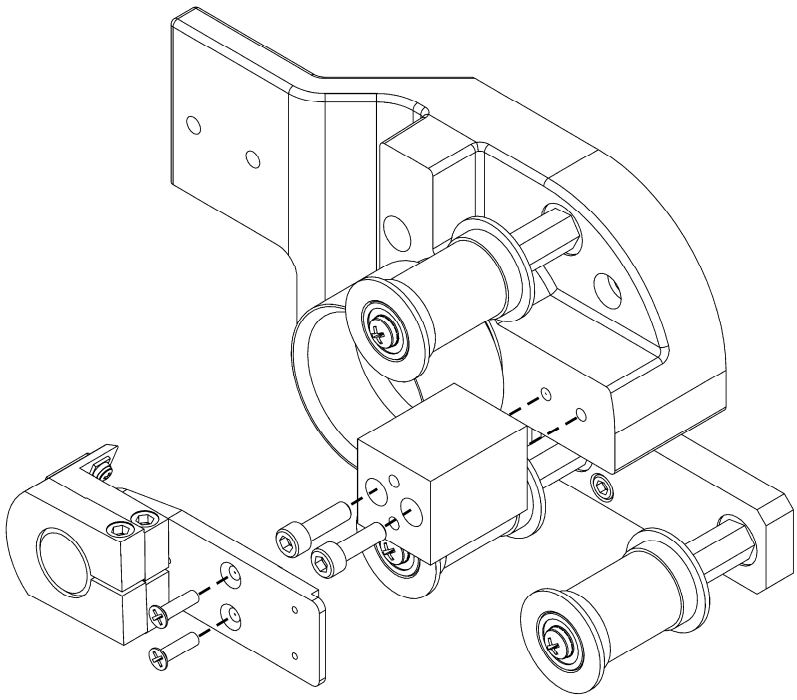
# Chapter 1:  Reader Kit Installation

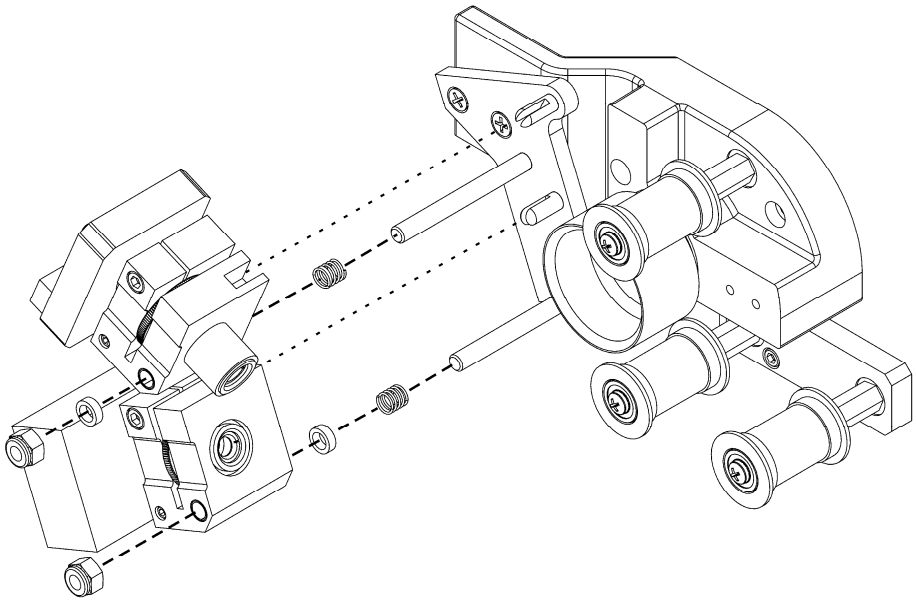
The reader mounting plate attaches to the casting with 10-32x1/2" flathead Philips screws as shown.



The LED standoff attaches to the casting with 8-32x5/8" socket head cap screws into counterbored holes. These screws will be hidden after the next step. You may want to thread lock them in place.

Next, the LED mounting plate attaches to the standoff with 6-32x1/2" Blk flathead Philips screws.



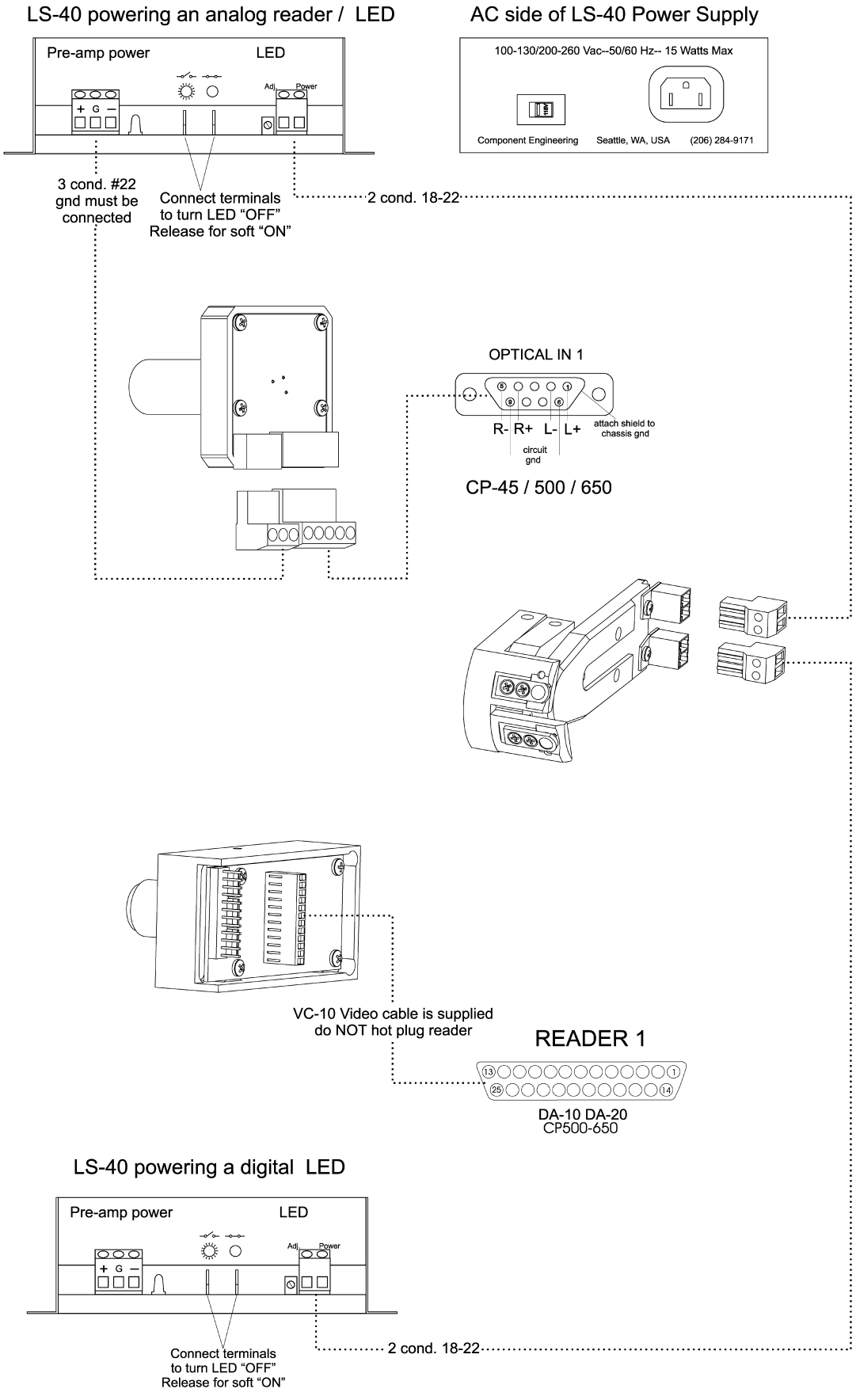


Slide each lens block over the proper threaded shaft. Each end of the hole has a bearing insert. Use care not to catch the inner edge of the bearings and displace them. The short shaft with the cutout fits into the slot on top of the lens block.

The analog reader is mounted on top.

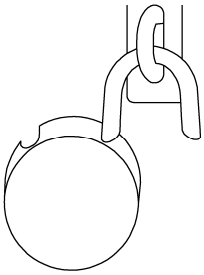
Note the position of the spacers. There is one for each reader. One is outside the analog reader and the other inside the digital reader. This spacer compensates for the distance between the analog and digital soundtracks.

# Wiring the Readers and Power Supplies

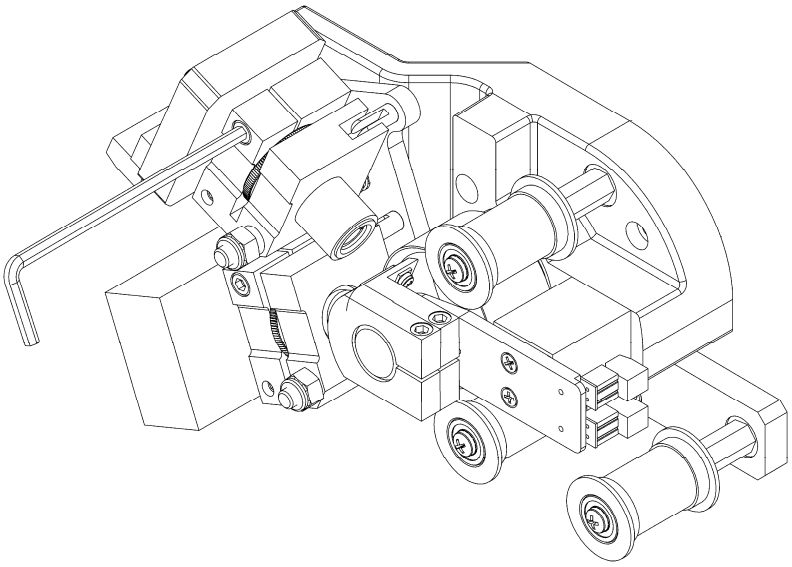


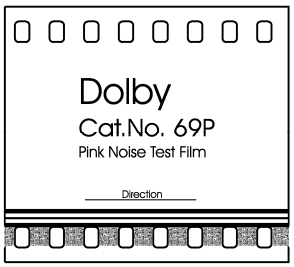
# Chapter 2:  Reader Kit Alignment: Analog

## Analog Focus



Use a 5/32" Allen wrench to unlock the analog reader adjustments.

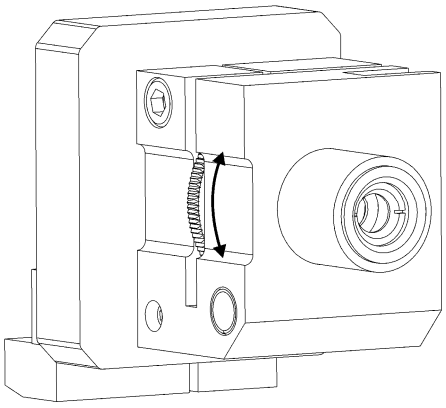


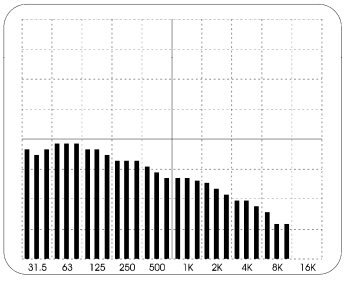


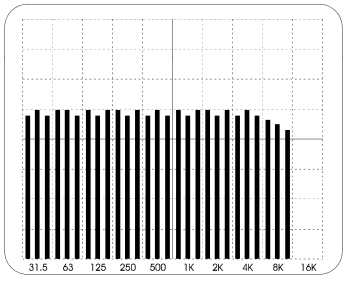

Prepare the cinema audio processor for alignment by ensuring that both channels of the optical pre-amp are at equal gain.

Thread and run Dolby Cat. No. 69T. Use an R.T.A. to view the frequency response.

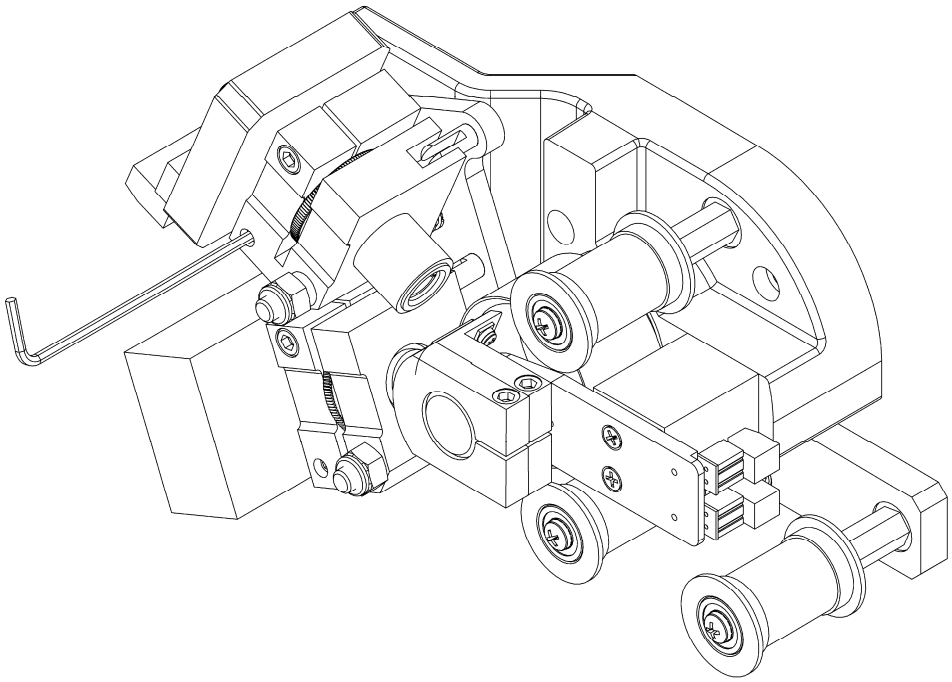
Rotate the focus ring to fine-tune the focus. Results that are nearly flat to 12K are usual.

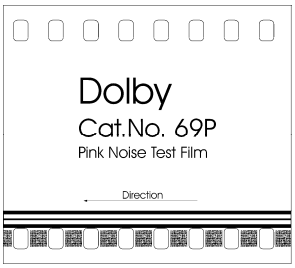




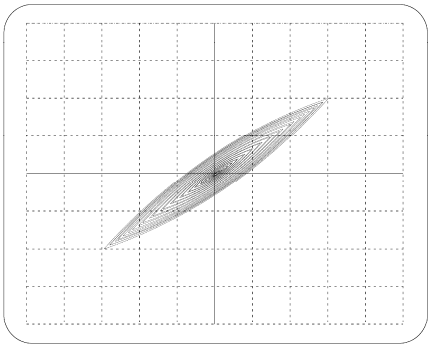
# Analog Azimuth

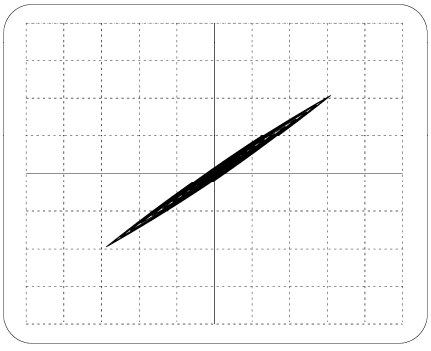




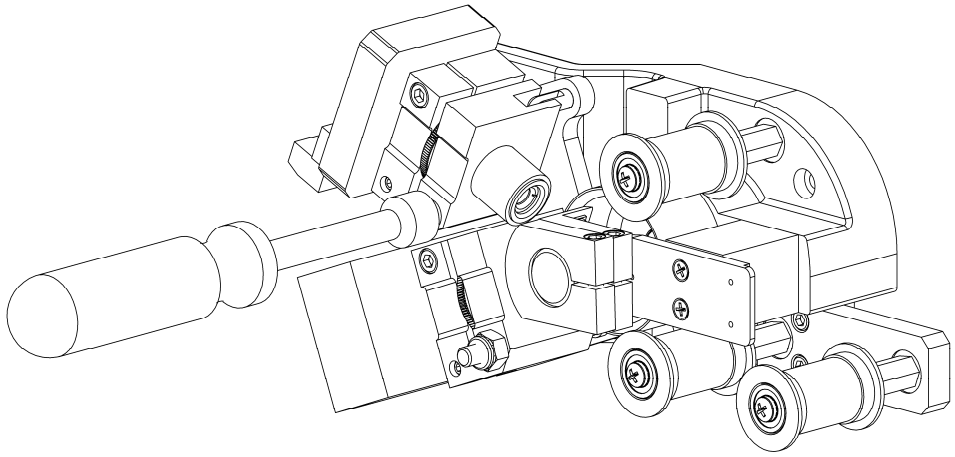

You may continue to run the Cat. No. 69P for this test. View with a dual trace oscilloscope set to XY mode. Use a 5/32 Allen wrench to fine tune the reader azimuth adjustment. An extremely narrow trace is the desired result.

A trace that "leans" the other direction indicates that the two channels are wired in opposing phase. If this is the case. Correct and proceed.

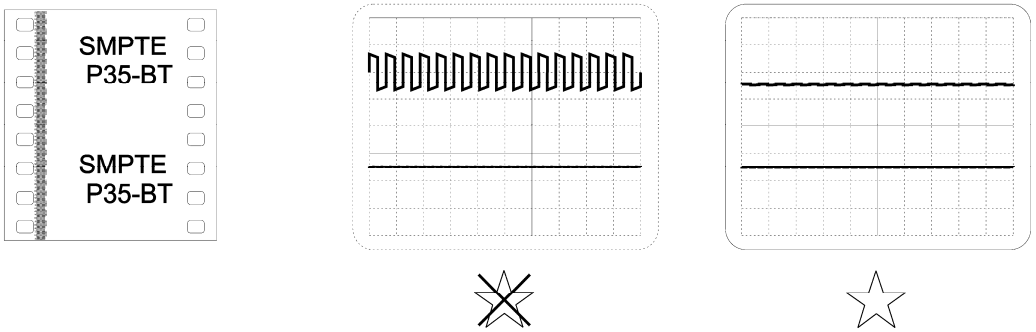




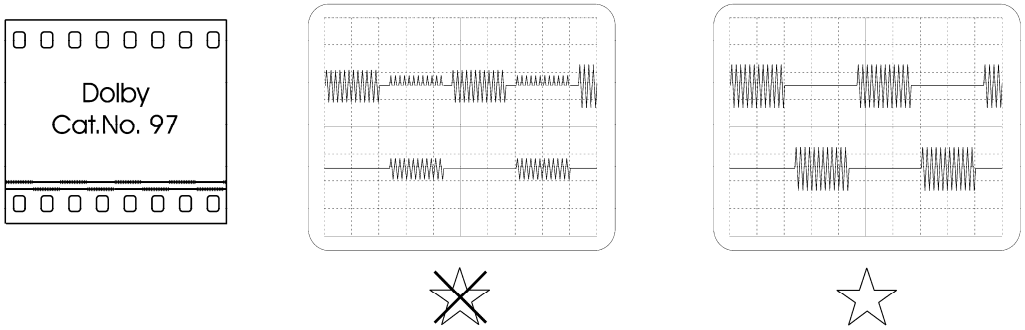
# Analog Lateral



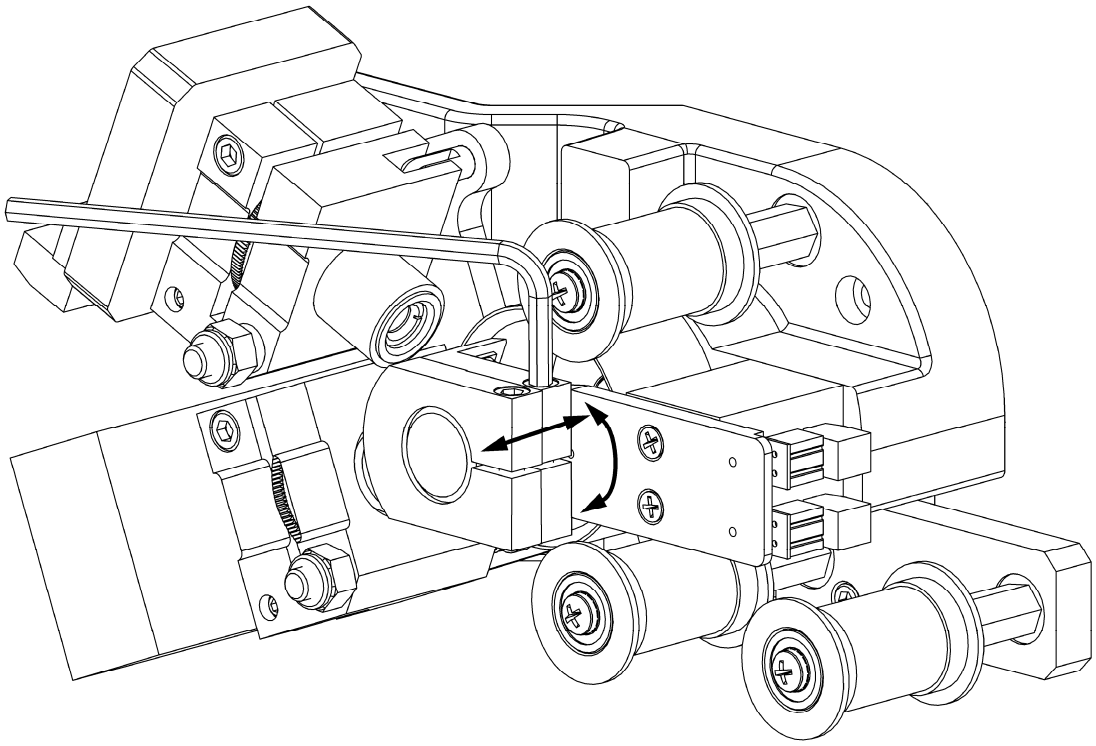
Thread and run SMPTE P35-BT Use a dual trace oscilloscope to view the waveforms. A 7/16" nut driver is used to adjust the reader laterally. The desired result is a minimal, equal signal on both channels. The reader is set to read 100% track width. A very small waveform may be seen.




Thread and run Dolby Cat. No. 97. Use a 7/16" nut driver to adjust the reader laterally. The goal is to minimize cross talk between the channels. Zero cross talk should be easy to achieve. The channels may be at different levels until the LED is in perfect adjustment. You may want to recheck this setting after that step.

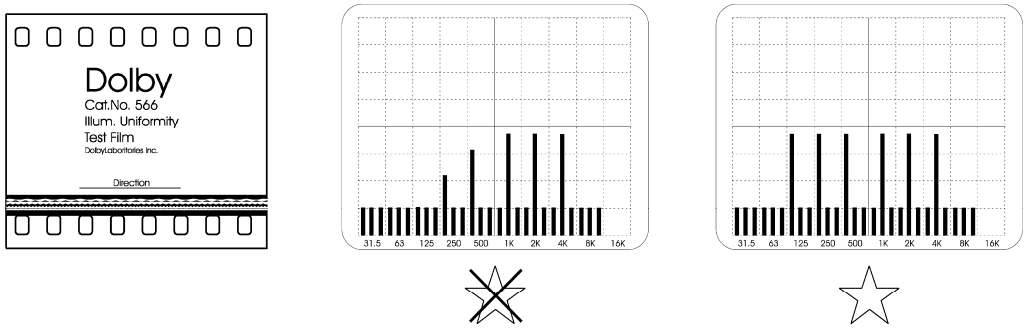


# Analog Illumination

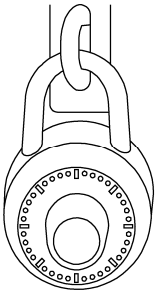


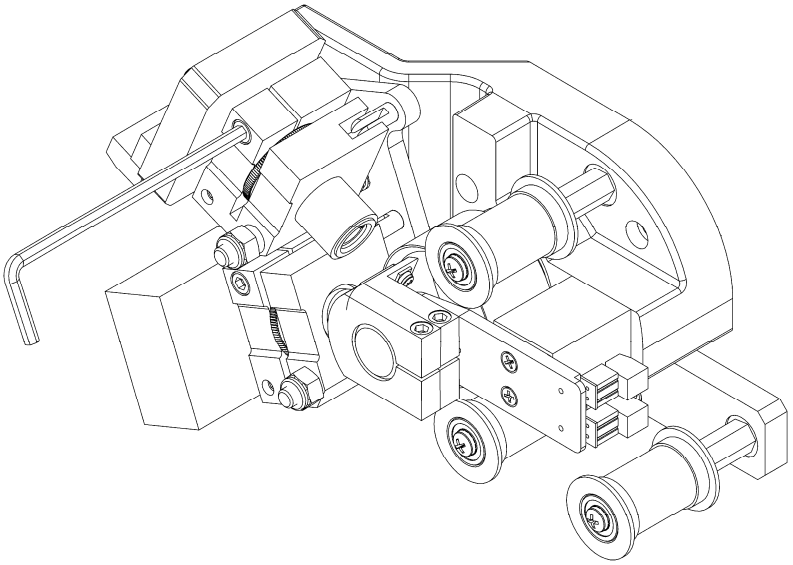
Thread and run Dolby Cat. No.566 Illumination uniformity test film. Use a 9/64 allen wrench to loosen the socket head cap screw enough to permit moving the copper LED mount by hand. Ensure that both channels of the optical pre-amp are at equal gain. Rotate the assembly to achieve the highest traces. Move the assembly in and out to illuminate equally all six-frequency bands.

Pay most attention to the extreme left and right. In a dual system you may have to move the digital LED out of the way a bit to give yourself adjustment room. Tighten the screw when adjustment is complete. Minimal torque is required. The large surface area makes excessive tightening unnecessary.



# Analog Complete





The analog alignments have been listed in a logical order. Some of the adjustments are interdependent so they may need to be repeated or perhaps re-checked. If all is well this is the time to lock down the reader adjustments using a 5/32" allen wrench. One could also check that the socket head clamp screw holding the analog LED in place is locked down properly.

The next step would be to set Dolby level using Dolby Cat. Number 69 T test film.

1. Set the processor optical pre-amp at 80% gain and the slit loss compensation at zero.

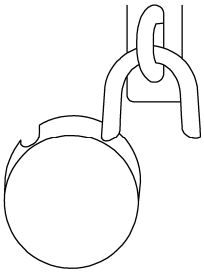
2. Adjust the LED current control on the analog LED power supply to achieve Dolby level.

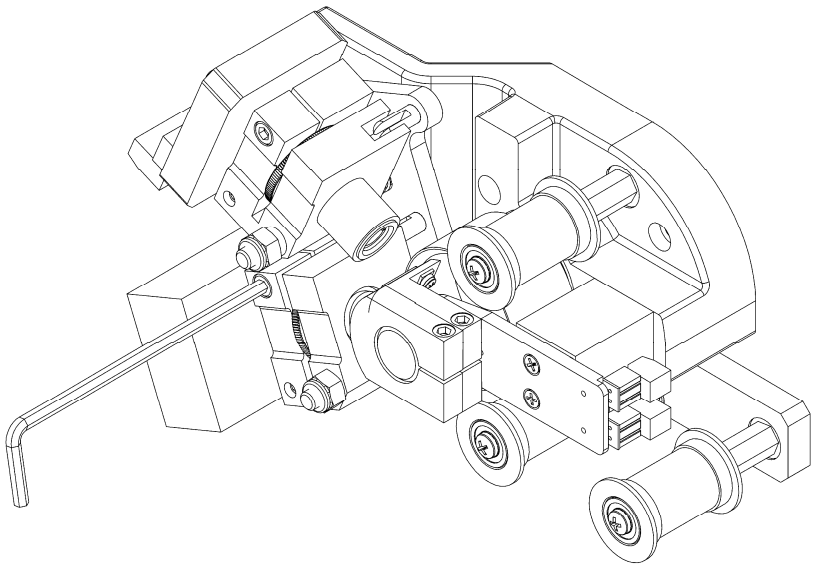
3. Fine tune the pre-amp controls so both channels are at Dolby level.

4. If there is a significant difference in the required gain for each channel you may want to repeat the LED alignment procedure.

5. If not.....analog alignment is complete.

# Chapter 3:  Reader Kit Alignment: Digital





Use a 5/32" Allen wrench to unlock the digital reader adjustments.

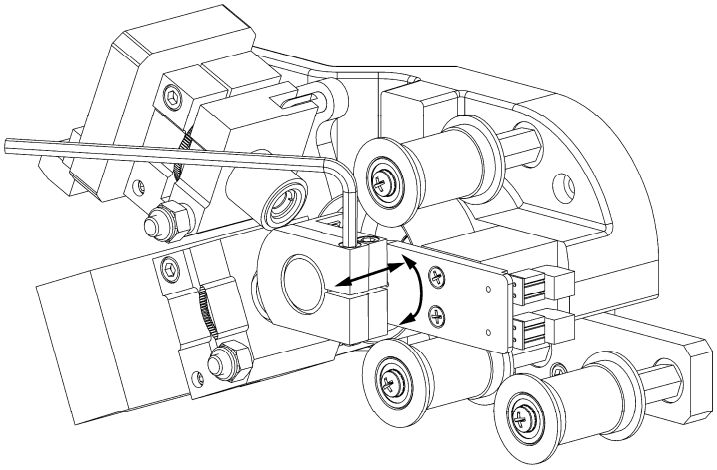
The digital alignment section includes snapshots from oscilloscope displays and screen shots from Dolby DRAS reader alignment software. The directions for connecting and calibrating your oscilloscope are included with the installation manual for your Dolby Digital Cinema processor. You will need a PC with a serial port and a pin-to-pin cable to connect and run DRAS software. Most alignment representations do not indicate perfect results. This is not an accident or improper alignment. Dolby Cat. No. 530 QC10 calibrated digital test film has offsets hand printed on the film stock. There are error correction numbers for lateral offset, azimuth and vertical jitter. The unique number on your particular length of film is the desired reading on DRAS software. The film shown is Dolby Cat. No. 69. This film is used to make the QC10 calibrated test film. The error offsets are added along with a sticker that identifies it as Dolby Cat. No. 530.

DRAS software will not give a reading until the reader is in near perfect alignment. The steps are listed in a way that assumes you will be making at least two passes. The first with the scope and the second to fine tune with DRAS and the scope. It is a good idea to become familiar with all of the information relating to the digital reader prior to installation. Use care not to plug the reader into the digital processor when the processor is powered up. This will usually destroy the circuit board in the digital reader.

All adjustments are made while running the same test film. Either Dolby Cat. No. 530 or Cat. No. 69 P or T. You may not be able to perform the alignment steps in the order they are presented here.

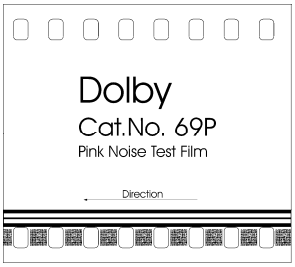
# Digital Illumination

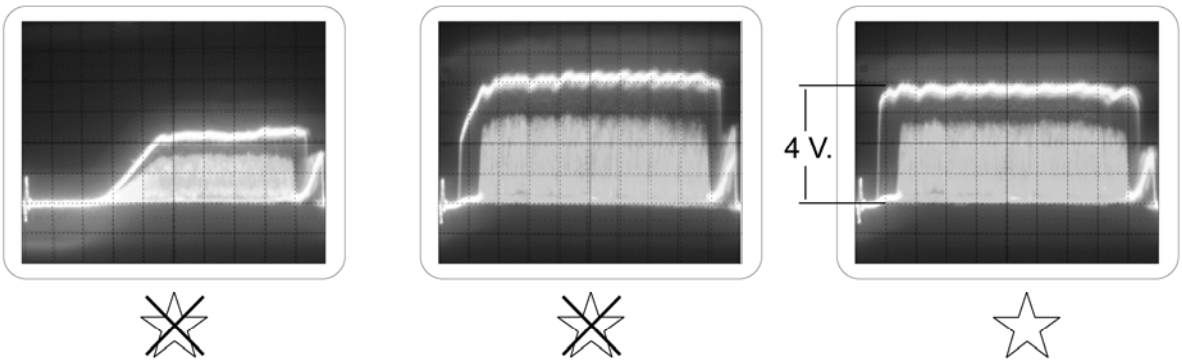
You will need to have some signal showing on your scope to begin. There is help getting started in a section entitled "kick-starting digital alignment" that follows.



Use a 9/64" allen wrench to loosen the socket head cap screw enough to permit moving the copper LED mount by hand. Rotate the assembl to achieve the highest traces. Move the assembly in and out to evenly illuminate the entire digital block. Pay close attention to the edges of the digital burst. The desired patter would be straight up the left side, straight across the top and straight down the right side. Some unevenness will appear on the top edge. Careful adjustment can minimize this effect.

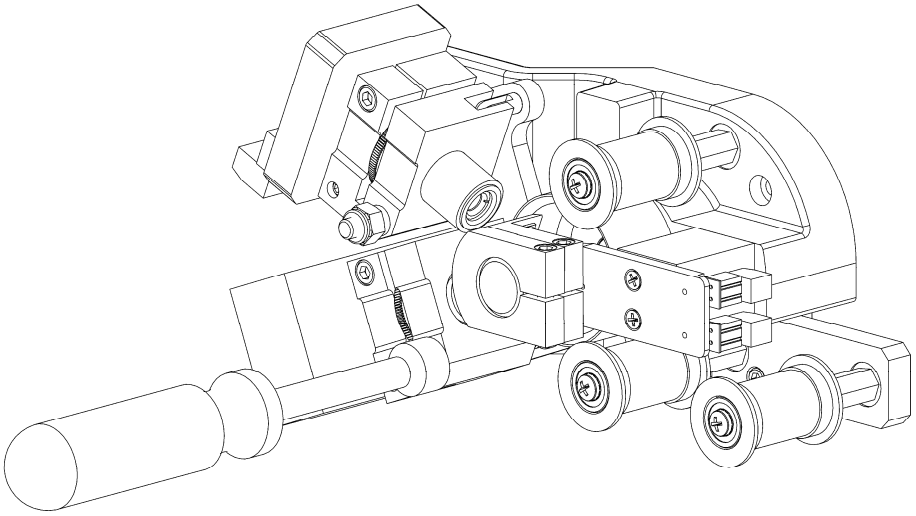
Tighten the screw when adjustment is complete. Minimal torque is required. The large surface area makes excessive tightening unnecessary. The last step is to adjust the LED current from the power supply to reach 4 volts of video.

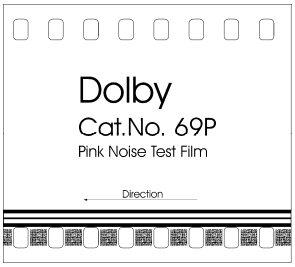


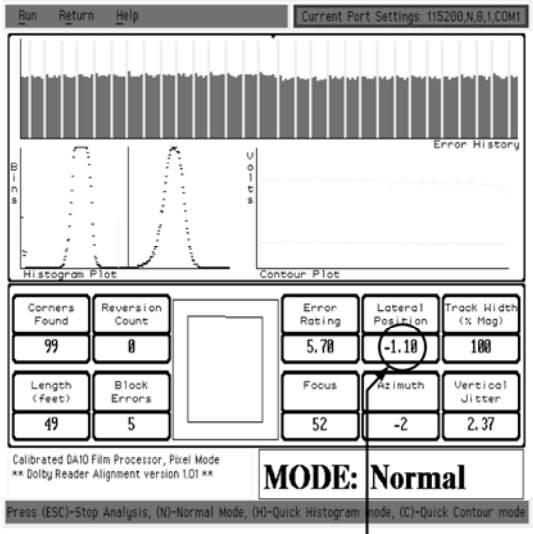



# Digital Lateral

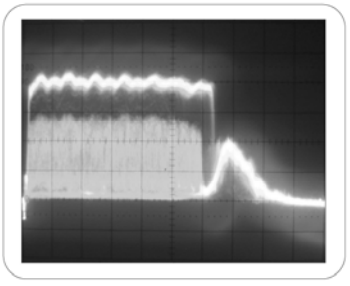
A 7/16" nut driver is used to make lateral adjustments to the reader. Dolby Digital test film has error correction numbers printed on it. It is usual to have lateral error in the range of + or - 2.

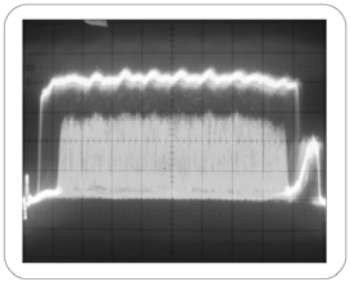




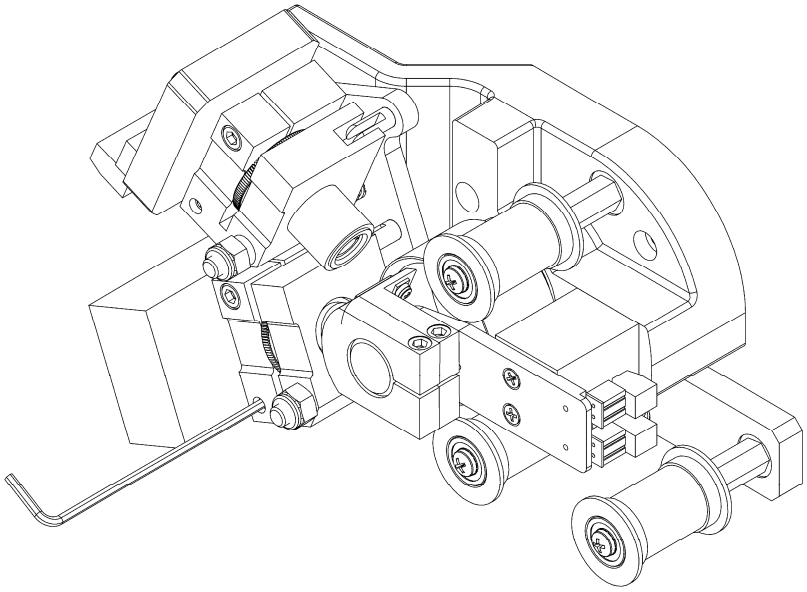

Lateral statistic is corrected for test film error

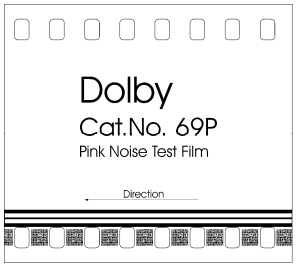


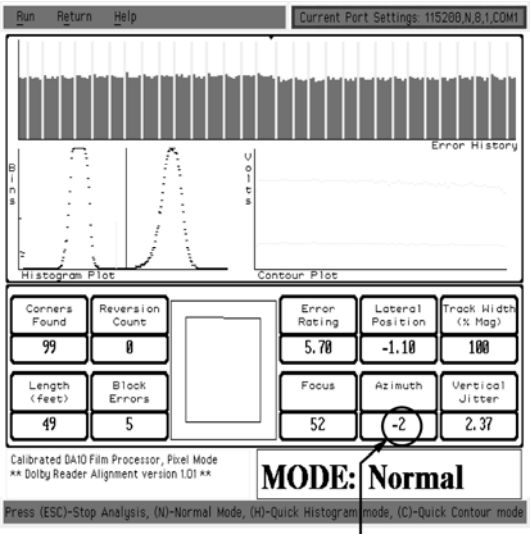


# Digital Azimuth

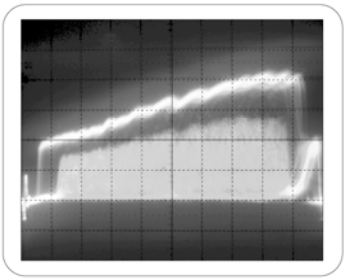
Use a 5/32" allen wrench to adjust the reader azimuth. Digital test films from Dolby have error correction numbers printed on them. It is usual to have azimuth error in the range of + or - 2.

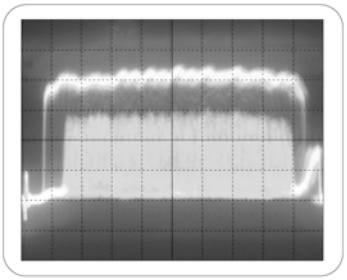




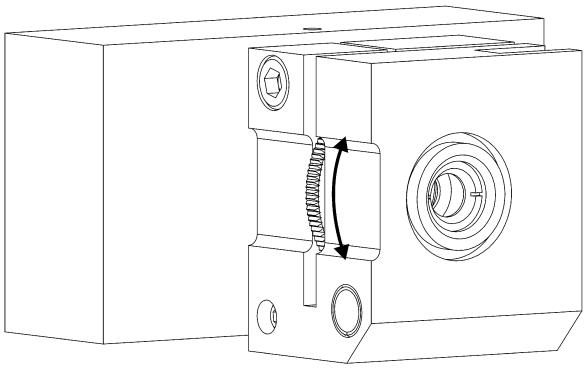



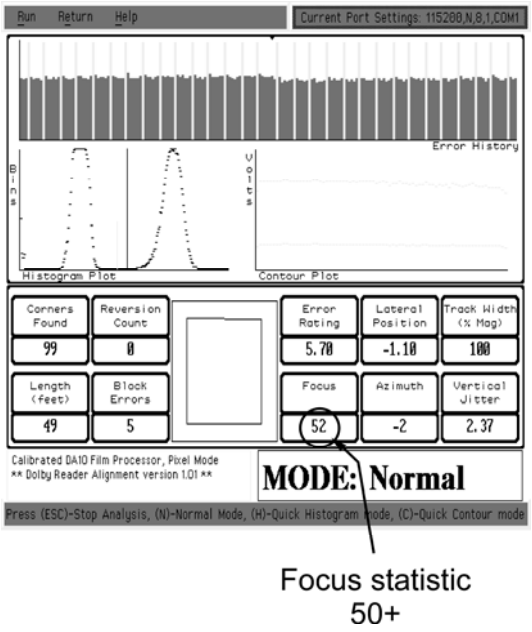

Azimuth statistic is corrected for test film error

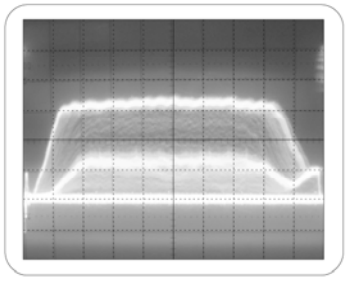


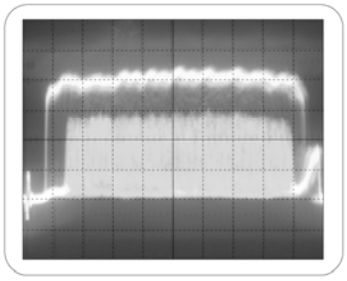


# Digital Focus





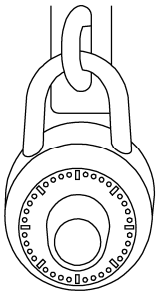



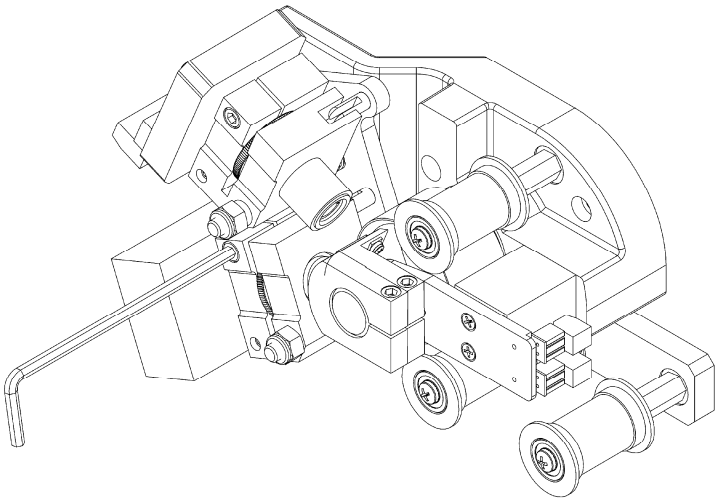


If you have gone through to this point using your oscilloscope you may be able to set the focus using both the scope and DRAS.

Thread and run Dolby Cat. No. 69T. Use an oscilloscope and a PC running Dolby's DRAS program to view the digital trace and see the focus statistic. Rotate the focus ring to fine-tune the focus. A "hollowness" in the digital burst will be visible on the scope. Results in DRAS that are above 50 are usual.

# Digital Complete





The digital alignments have been listed in a logical order. Some of the adjustments are interdependent so they may need to be repeated or perhaps re-checked. If all is well this is the time to lock down the reader adjustments using a 5/32" allen wrench. One could also check that the socket head clamp screw holding the analog LED in place is locked down properly.

It is not unusual for new prints to report error rates of 2-3. If you achieve this result digital alignment is complete.

If not.....A section dealing with digital troubleshooting is included.

# Chapter 4:  Trouble in Paradise? Analog

## Common Analog Problems, Symptoms, Errors and Bad Fortune

### LEDs are not lit?

The AC power cables insert deeply into the AC socket on the LS-40 power supply. It may look plugged in but not be fully inserted.

There are 2 fuses inside the LS-40 power supply. They are the smaller European style 5x20mm glass fuses. .125 amp slo-blo if set for 110 Vac .0625 amp slo-blo if set for 220 Vac.

The switching logic to the LS-40 is reverse logic. Closed contacts are off. Open contacts are on.

### No analog audio?

The LED power supplies are shipped with the current set to minimum. Some adjustment will be necessary.

The analog pre-amp power wiring polarity is clearly marked on the plugs. The ground MUST be connected at both ends. It is the circuit ground. Reference zero for the bi-polar supply.

### Poor quality analog audio?

The polarity of the analog channels is clearly marked on the plug. Confusion in the channels ( dialog from the surrounds ) is usually a result of out of phase wiring.

Many systems will require that the analog reader be grounded at both ends (reader and processor) . The opposite of the time honored convention. Some will require that the reader ground be connected to the circuit ground connections of the processor and that the audio cable shield be connected to the hood of the DB9 connector. The latter is a rare occurrence.

It is possible that a slight maladjustment to an LED will allow projector micro phonics to enter the analog audio. A fine-tuning of the LED position will not only make this effect vanish but will increase the signal level and permit the use of less current to the LED.

Some older processors will not provide the proper load to our reverse scan readers , with very odd results. A common fix is to put a 500-ohm resistor across each pair of audio channels. This value may not be correct for all processors with this problem.

# Chapter 5:  Trouble in Paradise? Digital

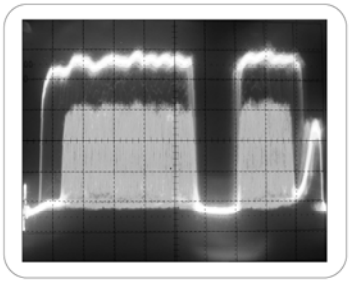
## Common Analog Problems, Symptoms, Errors and Bad Fortune

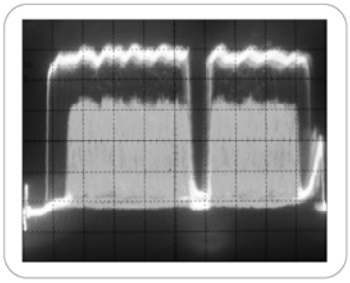
### The digital reader appears to be dead.

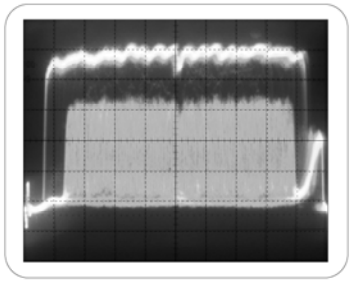
A Dolby Digital reader is at the heart a video camera. You can test it by shining a light source into the lens and watching for a signal on your oscilloscope. If it is not functioning at all it is likely that the reader was "hot plugged" into the processor. If this has happened a replacement digital circuit board is required.

### The Dolby Digital reader has an odd scope trace.

It is possible to have a foreign object in three places. The scope trace would look similar in all cases. It could be on the LED itself, the reader lens, or on the CCD chip that is inside the reader. Pictured below are three traces of what you might see. If the dip is in sharp focus it is on the LED or the CCD. All parts should be cleaned with a clean dry Q-tip.







These look very similar to a film scratch. The film scratch would show a dip in the digital burst but not in the envelope. The sprocket hole would be untouched so the digital burst would show problems but not the frame it appears to be in.

### The Dolby Digital has a high error rate.

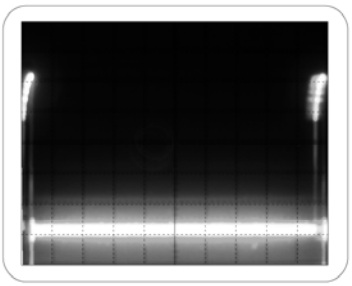
A Dolby Digital reader depends on the proper performance of the mechanical parts of the sound head. The film must be properly registered , at a constant speed, with even and sufficient illumination. If you have performed all the alignment steps successfully and the error rate reported is not satisfactory it is likely that there is a mechanical problem with the projector/sound head. It could be making the film move side-to-side or causing vertical jitter. In either case you will see the movement on your scope. Either the trace itself will move side to side or the right hand side of the sync pulse on channel 2 will have movement.

There are many causes for poor sound head performance. Worn or damaged mechanical parts, film guidance parts, sprockets, bearings, etc. If the Digital reader is capable of making scope traces that closely resemble those shown in the alignment procedures but play with a high error rate it is safe to assume that the problem is mechanical and proceed in that direction.

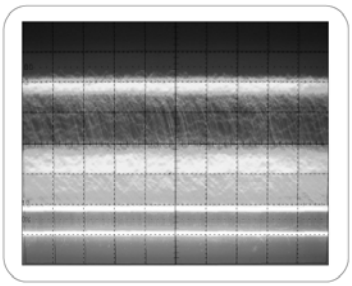
# Chapter 6:  Kick-Starting Digital Alignment

## Basic Help on Getting There from Here

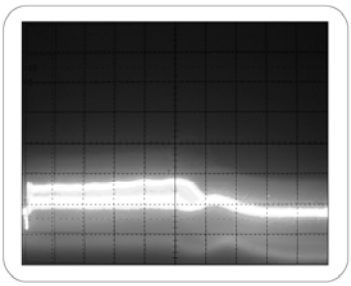
The first step is to get something up on your scope. The snapshots below show some of the typical scope displays you will see as the alignment begins.



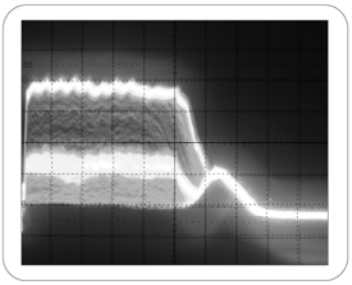
Channel 2 is up and calibrated. Time to rotate it off the screen.



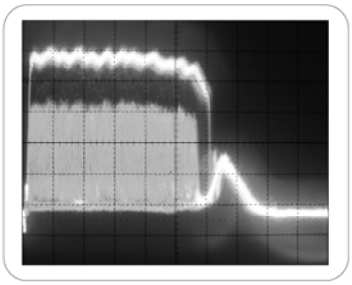
Channel 1 is showing but not triggering properly from channel 2.



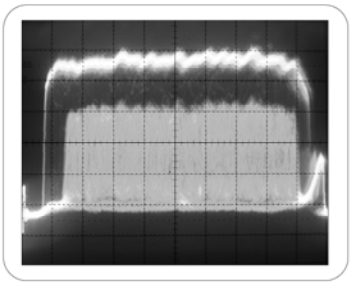
A little bit of digital showing low and to the left.



A little more digital showing as the LED is adjusted.



A better view of the digital burst as the focus is adjusted.

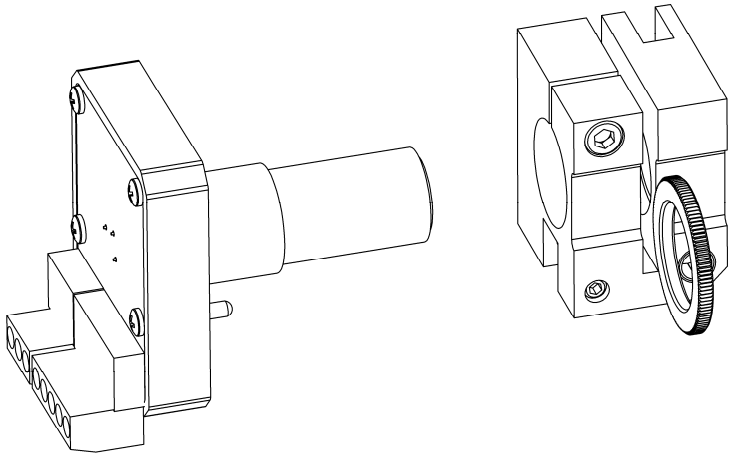


The lateral adjustment puts the digital burst close to the proper position.

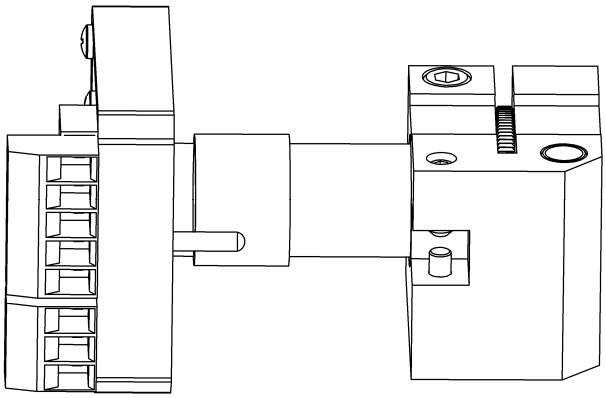
The last trace shows a very good place to begin. The digital burst is in pretty good focus, has adequate illumination and is close to the proper lateral position on the calibrated scope screen. You may be able to run DRAS at this time. If so.....watch the number in the upper left hand corner of the screen. The statistic "corners found" must be up around 80+ or the readings reported by DRAS are suspect.

# Chapter 7:  Removing a Reader

A reader (digital or analog alike) can be removed from the lens block without disturbing the azimuth or lateral adjustments. To do so, loosen the lens clamp screw and turn the focus ring in the CCW direction. The reader will slowly back out of the assembly. At the point that the lens tube is free of the focus ring it can be pulled the rest of the way out. The focus ring will be free in the assembly. Remove it for safekeeping.



To replace the reader. (Clamping screw still loose of course) Place the focus ring back into the slot. Guide the reader into the opening. The index pin on the reader box fits into the recess, between the azimuth adjustment screw and the spring-loaded plunger. Push the plunger out of the way with a fingernail or small screwdriver. The pin can now move between them.



Next you need to start the threads of the focus ring. The focus ring will turn very smooth and easy when it is in the threads properly. If this is not the case. Pull the reader out a little and try again.